REGULATORY CAPITAL REQUIREMENTS FOR U.S. LIFE INSURERS

Presentation to the Federal Reserve Board Insurance Industry Work Group

July 11, 2017

Presenters

- Nancy Bennett, MAAA, FSA, CERA,
  Senior Life Fellow
  American Academy of Actuaries

- Tom Campbell, MAAA, FSA,
  Chairperson, Variable Annuity AG 43/C3 Phase 2 Work Group
  American Academy of Actuaries

American Academy of Actuaries

- The American Academy of Actuaries is an 19,000-member professional association whose mission is to serve the public and the U.S. actuarial profession. For more than 50 years, the Academy has assisted public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

AMERICAN ACADEMY of ACTUARIES

Objective. Independent. Effective.™

Discussion Topics

- RBC and the U.S. Solvency Framework
- Purpose of Regulatory Risk-based Capital (RBC)
  - Risks covered by Life RBC
  - Formula Basics of Life RBC
- Development of Specific RBC Factors
- Deep Dive: Market Risk
  - RBC Requirements for Fixed Annuities
  - RBC Requirements for Variable Annuities
- Concluding Observations

RBC and the U.S. Solvency Framework

- RBC was implemented in 1993 as part of the National Association of Insurance Commissioners' (NAIC) earlier solvency modernization project
  - Three RBC formulas are used: life, health, and casualty
  - Many changes have been made to all three formulas since 1993
- RBC is one part of the framework for monitoring the solvency of insurers operating in the US; other tools include:
  - Risk-focused examinations of insurers
  - Cross-state review of insurers' financial position, with the domiciliary state taking the lead; uniformity in insurance regulations assured through a state accreditation process
  - Conservative statutory accounting and reporting requirements, investment laws governing permissible types and limits on asset classes
  - Actuarial certification of the adequacy of policy and claim reserves based on each company's unique risk profile
  - Newer regulatory processes include supervisory colleges directed toward the regulation of insurance groups and a newer regulation being adopted by the states that requires many insurers to submit an Own Risk Solvency Assessment (ORSA)

Objectives of the RBC System

- Create a relatively simple formulaic structure that identifies potentially weakly capitalized companies; RBC ratios are not designed to compare capital strength of companies
- Design a formula that is applied to all companies based on information available in statutory filings
- Provide a regulatory tool that initiates a more extensive review of an individual company's risks and capital (including proprietary models and other detailed analysis) for those companies that are likely to be, or are weakly capitalized, in order to determine if corrective action(s) are needed
- Establish an objective standard for triggering regulatory action, including the authority to take over a company under certain conditions, such as falling below a certain capital level

Regulatory Trigger Points

- Regulatory action levels are triggered when the Total Adjusted Capital (TAC) falls below certain levels
- Regulatory action levels were empirically established by regulators in the early ‘90s
  - Action levels were determined by reviewing the insurers known to be weakly capitalized at the time
  - Action levels are not based on any objective statistical data

Regulatory Trigger Points (cont.)

- When TAC falls below the **Company Action Level (CAL),** the company is required to submit an RBC plan to the commissioner of the domiciliary state, which is subject to commissioner approval
- The **Regulatory Control Level** is defined as 150% of the Authorized Control Level (ACL); company must submit plan and subsequent regulatory actions will be mandated
- The **Mandatory Control Level** is defined as 70% of ACL authorizing the domiciliary commissioner to rehabilitate or liquidate the company
- The **Authorized Control Level** is defined as 50% of CAL, authorizing the domiciliary commissioner to take whatever actions are necessary to protect policyholders and creditors

Background on RBC

- RBC establishes a de facto minimum level of capital
  - RBC creates a "reference point," via the RBC formula, whereby regulators can compare a company's actual statutory capital position to this regulatory reference point
  - RBC amount is not related to the "value of business"; RBC does not represent the amount a willing buyer would pay to assume a company's obligations or an "exit value" but it does represent the minimum amount of capital a willing buyer would have to maintain in the company if it were purchased
- RBC formula is not designed to achieve a stated calibration level or maintain aggregate capital requirements at a stated calibration level as an outcome of the RBC calculation
- Generally, minimum capital requirements in combination with statutory reserves are expected to be sufficient to protect insurer solvency 95% of the time over a five to seven year time horizon

Background on RBC (cont.)

- RBC calculation is based on statutory accounting principles whose goal is to protect policyholders; RBC is a tool for insurance regulators, not investors
- Required capital calculation assumes a going concern, not a liquidation environment
- Required capital is viewed as an add-on to statutory reserves under the assumption that policy and claim reserves are adequate; RBC factors were established to capture risk levels above the levels captured in policy and claim reserves

Background on RBC (cont.)

- RBC formula is neither pro-cyclical or counter-cyclical; RBC was designed to be cycle-neutral
  - RBC factors are primarily independent of the current economic environment (exception: some C3 requirements)
  - Many factors are based on the average of past economically driven events; averaging builds in a countercyclical "muting" in contrast to capital requirements based on current economic risk factors
- While economic and business environments may cause risk exposures to fluctuate in the short run, the RBC formulas capture the effects of risks that could materialize over a short to medium time horizon

Risks Covered by Life RBC

- The focus of the original LRBC formula was the identification and measurement of the risks that could affect an insurer's statutory solvency
- RBC framework is based on separate distributions for material risk components (i.e., C0–C4 RBC components) that are aggregated to determine total capital requirements:
  - C-0: risks from affiliates
  - C-1: investment risks
  - C-2: claims risk (i.e., mortality and morbidity)
  - C-3: interest rate risk, health credit risk, market risk
  - C-4: general business risks

Risks Covered by Life RBC (cont.)

- Correlation of risks between these risk categories is reflected:
  - For correlations pertaining to risks other than interest rates and equity returns, a simple assumption was made
  - Each major risk category was considered to be either completely independent of other risk categories, or completely correlated with the other risk categories
  - After this determination was made, a statistical adjustment was made to adjust for risk correlation among the major "C" risk categories, known as the "covariance adjustment"

Risks Not Included in Life RBC

- The LRBC system assumes that appropriate policy reserves have been established and LRBC provides a cushion for risk levels beyond those risks covered in reserves
  - Policy reserves are intended to cover expected losses that arise under moderately adverse conditions
  - Moderately adverse conditions have been implicitly assumed to occur at one standard deviation (roughly the 83rd percentile for normally distributed risks)
- LRBC establishes capital requirements for losses that arise under more adverse conditions (e.g., beyond one standard deviation)

Risks Not Included in Life RBC (cont.)

- The following types of risks are intentionally excluded from the Life RBC formula:
  - Immaterial over the LRBC time period (i.e., which generally covers risks that could abruptly materialize over a short to medium time frame, such as three to five years) - Example: longevity risk
  - Tail Risks, or risks that materialize beyond the tested portion of the risk distribution (i.e., in the outside tails of the distribution beyond the 95th percentile); these risks materialize so infrequently that they only exist beyond the stated calibration level
  - Risks that are not effectively mitigated by capital, such as liquidity or specific operational risks

Breakdown of LRBC Components

December 31, 2016 Industry Data in Aggregate*

C-0 Asset Risk - Affiliates	1.67%
C-1cs Asset Risk - Common Stock	35.93%
C-1o Asset Risk - All Other	28.70%
C-2 Insurance Risk	9.68%
C-3a Interest Rate Risk	19.81%
C-3b Health Credit Risk	0.00%
C-3c Market Risk	0.29%
C-4a Business Risk	3.86%
C-4b Business Risk	0.05%
Total	100.00%

* Source: http://naic.org/documents/research_stats_rbc_results_life.pdf

Life RBC Formula Basics

- The Life RBC ratio is defined as the TAC divided by the ACL Risk-based Capital
- TAC is equal to unassigned surplus plus asset valuation reserve (AVR) plus one-half of the dividend liability
- The ACL Risk-based Capital is 50% of Company Action Level RBC as calculated from the following formula:

$$CAL = C0 + C4a + \text{Square Root of } [(C1o + C3a)^2 + (C1cs + C3c)^2 + (C2)^2 + (C3b)^2 + (C4b)^2]$$

Life RBC Formula Basics (cont.)

- RBC is calculated at the legal entity level for every insurance company; no charge for contagion risk
- NAIC has not yet defined regulatory capital requirements at the group level; work on a group capital assessment tool is underway
- The Life RBC formula calculates a post-tax amount; the P&C and Health formulas are pre-tax

The C1 Component

- C1 capital protects against future *excess* asset losses
  - Policy reserves make provision for expected asset losses
  - C1 capital makes provision for asset losses in excess of expected
- C1 capital covers the risks of default loss, deferral, subordination & credit leverage, and event risk
- C3 capital covers the risks of call/early redemption/prepayment, extension, disintermediation, reinvestment
- Life RBC does not cover the risks of fair value depreciation, currency fluctuation, and liquidity

Major C1 Factors

- Bonds (includes most fixed income: corporate bonds, structured securities, municipal bonds, private placements, preferred stock)
- Common Stock
  - Affiliated (C0)
  - Unaffiliated
- Commercial Mortgages
- Investment Real Estate

Major C1 Factors: Statistical Safety Level

- Bonds
  - Factors defined for each major rating class; C1 for bond portfolio set at the 96th percentile over ten year time horizon
  - The C1 capital charges are derived from a simulation model where the cash flows for a representative bond portfolio are projected assuming different economic scenarios
  - The required capital for a given economic scenario equals the amount of initial funds needed such that the accumulation of this initial amount and subsequent cash flows will not become negative at any point throughout the modeling period
- Common Stock (CS)
  - Affiliated (C0)

    Capital requirements for affiliates are based on a "look-through" approach, where the RBC is determined for the affiliate and held on the parent books
  - Unaffiliated

    Capital requirements for Unaffiliated CS is based on the expected volatility of CS over two years - CS is carried at market value and the C1 charge protects surplus from fluctuations in CS value. The basic charge is 30%, further adjusted for the riskiness of an insurer's CS portfolio relative to the S&P500

Major C1 Factors: Statistical Safety Level (cont.)

- Commercial Mortgages in Good Standing
  - The factors provide for differing levels of risk, the levels determined by a contemporaneous debt service coverage ratio and the contemporaneous loan-to-value. The 0.14 percent pre-tax factor on insured and guaranteed mortgages represents approximately 30-60 days interest lost due to possible delay in recovery on default -The pre-tax factor of 0.68 percent for residential mortgages reflects a significantly lower risk than commercial mortgages
  - Statistical Safety Level (SSL) defined as the 92nd percentile over ten years
- Mortgages 90 Days Overdue, Not in Process of Foreclosure
  - The pre-tax factor for commercial and farm mortgages of 18 percent is based on data taken from the Society of Actuaries "Commercial Mortgage Credit Risk Study" - For insured and guaranteed or residential mortgages, factors are set at twice the level for those "in good standing" to reflect the increased likelihood of default losses
- Mortgages in Process of Foreclosure
  - Mortgages in process of foreclosure are considered to be as risky as NAIC 5 bonds and are assigned the same category pre-tax factor of 23 percent for commercial and farm mortgages
- Due and Unpaid Taxes on Overdue Mortgages and Mortgages in Foreclosure
  - The factor for due and unpaid taxes on overdue mortgages and mortgages in foreclosure is 100 percent

* Source: 2016 NAIC Forecasting Instructions, Life

Major C1 Factors: Statistical Safety Level (cont.)

- Investment Real Estate
  - Capital requirements for investment real estate are equal to 15% of statutory carrying value (pre-tax)
  - The 15% is based on an assumed correlation of 60% between the stock market and real estate market
  - No modeling was performed to develop the C1 factor

The C2 Component

- C2 RBC factors for life insurance are established to protect capital from the rapid deterioration of mortality experience, approximately five to ten years
- Major elements considered were the risks of improper pricing assumptions, random fluctuation, catastrophic events such as influenza pandemics and AIDS, and the "contagion" that creates sudden deterioration in experience, such as when price increases drive better risks away
- The factors chosen represent surplus needed to provide for excess claims over expected, both from random fluctuations and from inaccurate pricing for future levels of claims
- For a large number of trials, each insured either lives or dies based on a "roll of the dice" reflecting the probability of death from both normal and excess claims; The present value of the claims generated by this process, less expected claims, will be the amount of surplus needed under that trial
- While some believed expected claims was the most appropriate base for the factors, Net Amount at Risk (NAR) was used instead, due to easier availability and greater consistency among companies
- SSL for the C2 factors are based on a three year time horizon for group life insurance, and a ten year period for individual life - Δ95% confidence level was targeted

The C3 Component

- Established for the risk of losses due to changes in interest rate levels, the risks associated with minimum interest rate guarantees, the risk that health benefits prepaid to providers become the obligation of the health insurer, and risk of losses due to changes in market levels associated with variable product guarantees
- For risk of loss due to interest rate changes, the risk charge depends on the degree of mismatch between the asset and liability cash flows
- With more sophisticated modeling techniques being utilized by companies, C3 continues to evolve to reflect the unique risks and strategies of a company and incorporates a company's stochastic modeling into the reported value of C3 risk, including the market risk exposure of new guaranteed benefits on variable annuities

The C4 Component

- C4 capital covers a wide range of general business risks
- Due to the difficulty of quantifying those risks classified as business risks, the LRBC factors were not based on a quantitative risk analysis with the capital requirements based on a specific calibration level
- The formula factors were based on considering a company's exposure to guaranty fund assessments without attempting to exactly mirror the assessment formulas (because of the relationship between guaranty funds and insolvencies)
- For life and annuity business, the LRBC pre-tax contribution is 3.08 percent of Schedule T life premiums and annuity considerations before taxes

Deep Dive: Market Risk

American Academy of Actuaries

Objective. Independent. Effective.™

Provision for Market Risk: Statutory Reserves vs. Capital

- Insurance companies are required to hold reserves and capital to cover product guarantees and other product risks borne by the insurance company
- Statutory assets support the reserve liabilities and surplus funds; statutory asset values are specified by regulators with fixed income assets held at amortized cost (the major asset class for life insurers)
- Regulators specify minimum interest rates, mortality assumptions, and the methodology for calculating statutory reserves
- Reserves are subject to certification by an Appointed Actuary that reserves, in light of supporting assets, make adequate provision for the contractual obligations of the company under moderately adverse conditions
- RBC is designed to cover more extreme risk conditions

Provision for Market Risk

- Methods for reflecting market risk have evolved in insurance regulation along with
  - Product evolution
  - Modeling techniques
  - Real world experience during market ups and downs
- Industry exposure to market risk is greatest for annuity products, where that exposure has changed as products, insurers, and consumers have become more sophisticated
- Regulation has also evolved to better capture risks
  - Piloted with variable annuity products, where reserve and capital requirements are integrated;
  - Culminating in a principle-based reserve framework adopted for new life insurance policies issued in 2017 and beyond

Deep Dive: Market Risk (C3)

- C3 capital covers the risk of mismatch between statutory assets and liabilities
- C3 capital is established to identify circumstances where statutory surplus may not be sufficient to absorb the risk of losses due to changes in interest rate levels:
  - Largest exposure from fixed annuities, equity indexed annuities, and life insurance
- C3 capital is established to identify circumstances where statutory surplus may not be sufficient to absorb the risk of losses due to changes in market levels associated with variable product guarantees
  - Largest exposure from guaranteed minimum death benefits and guaranteed living benefits
  - Recall that the market risk associated with the basic variable contract is borne by the policyholder, not the insurer; therefore, minimal RBC is held for the basic variable contract

The C3 Component for Life Insurance

- C3 capital is set equal to 0.5% times (reserves – policy loans) - The factor assumes an A/L duration mismatch < 0.25
- The C3 requirement for life insurance is not stochastically determined, as the interest rate risk is not a material risk for life insurers
- The factor does not vary by insurer
- Discussions are underway to determine if capital requirements should change for life insurance policies valued under principle-based requirements

The C3 Component for Fixed Annuities (C3 Phase I)

- C3 Phase 1 requirements were defined in the early 2000's and now apply to almost all insurers - Prior to C3P1, capital requirements were based on a factor applied to statutory reserves
- C3 Phase I applies to fixed annuities, guaranteed investment contracts (GICs), single premium life insurance, and funding agreements
- C3 Phase I capital based on the cash flow testing results for 12 or 50 prescribed interest scenarios
- C3 Phase I capital also includes a charge for the callable assets supporting the untested products equal to 50% of the excess of statement value over call price

The C3 Cash Flow Testing Model (C3 Phase I)

- C3 capital is based on the distribution of cash shortfalls or deficits modeled over the period of time such that the net modeled cash flows approach zero (e.g., thirty years)
- This cash flow position is estimated by modeling the business over the prescribed interest rate scenarios (i.e., the 12 or 50) - The capital requirement for a given scenario is the worst present value of the projected deficit over the modeled time period, divided by the modeled reserves
- The results for the scenarios are ranked and the required capital is based on scenario results falling between the 92nd and 98th percentile of the distribution

C3 Phase I Modeling Assumptions

- Regulators prescribe the method (stochastic cash flow testing) and the level of required capital (weighted average of 92-98th percentile scenarios or CTE 90)
- Assumptions used in projecting future cash flows are based on best estimate assumptions, as defined by each individual insurer
- Economic scenarios are provided by regulators (as developed by the Academy's Life Practice Council)
- The projection model is developed by the insurance company; often, companies use the cash flow testing model used to certify reserve adequacy as their C3 model

The C3 Component for Variable Annuities (C3 Phase II)

- C3 capital is based on a stochastic model of projected cash flows over a number of economic scenarios (e.g., 1000 equity return scenarios)
- Similar to C3 Phase 1, C3 Phase 2 capital is based on a Conditional Tail Expectation (CTE 90) confidence level over the period of time such that the net modeled cash flows approach zero (e.g., 30 years)
- Capital requirements for VAs are tied to the reserves; VA reserves and capital are integrated

Methodology:
Scope of Actuarial Guideline (AG) 43/C3 Phase 2

- All variable annuities (deferred and immediate)
- Group variable annuities not subject to CARVM that have guaranteed minimum living and/or death benefits
- Other products with guaranteed minimum living and/or death benefits
  - that are “similar in nature” to VA guarantees; and
  - where there is no explicit reserve requirement
  - one example is a guaranteed minimum death benefit (GMDB) wrapped around a third-party mutual fund

Methodology: CTE Amount

- Solve for the amount of assets needed to pay projected claims and expenses in each scenario
  - Prudent Estimate assumptions for mortality, expenses, etc…
  - Run 1,000+ scenarios to pick up interest rate/market risk impact
  - Reserve = CTE 70 (avg worst 30%) of the distribution

	Claims and Expenses - Year "t"					
Scenario	1	2	3	- - -	30	Reserve (i)
791	x	x	x		x	163
34	x	x	x		x	157
75	x	x	x		x	154
486	x	x	x		x	142
.						
.						
.						
52	x	x	x		x	93
9	x	x	x		x	92
976	x	x	x		x	87

Reserve= Avg worst 30%
(CTE 70 Reserve)

Methodology: Constraints

- Balance Sheet Approach
  - A "Working Reserve" is included in the AG43/C3 Phase 2 calculations
- Greatest Present Value
  - The result for a given scenario is based on the greatest present value at the end of each projection year
  - In a down market scenario the resulting Total Asset Requirement (TAR) is close to the present value (PV) of claims and expense, subject to limitations on the fees included from the underlying separate accounts
- Starting Assets
  - Must equal estimate of the final reserve
  - Must use all separate account assets and all hedge assets
  - Drives out GA bonds that generally perform better than separate account funds at the CTE 70 level

All of these constraints tend to increase the reserves and C3 Phase 2 capital

Methodology: Constraints

- Scenarios for CTE Calculation
  - Must meet specified calibration points
  - Margin is included in these assumptions, but some argue that more conservatism is needed
- Standard Scenario
  - Added as a floor reserve
  - Formula-based reserve based on AG 33/34
  - Uses prescribed assumptions for returns and utilization
  - Serves as a basis for tax reserves

Methodology: AG 43/C3P2

- Methodologies are similar
  - C3 Phase 2 uses CTE 90 and brings in taxes (post-tax calc)
  - AG 43 uses CTE 70 and is done pre-tax
  - Calculations can be done together
- Company action level RBC is based on the difference between C3 Phase 2 and AG 43
  - RBC = TAR - reserves, but not less than zero
- "Smoothing" is allowed for C3P2 – weights current and prior year

	Down Markets	Up Markets
CTE 90 TAR (Total Asset Requirement)	147	115
CTE 70 Reserve	135	120
C3P2 RBC	12	0

Observations on Results: How can RBC be 0?

- Smoothing TAR
  - As noted this happened in 2008
- Pre-tax vs. After-tax
  - AG 43 is before tax; C3 Phase 2 is after-tax
  - So CTE 70 can be greater than CTE 90
- Standard Scenario (SS)
  - AG 43 SS is calculated for each contract while the C3P2 contract is calculated in aggregate
  - Even though the C3 Phase 2 SS assumptions are more conservative, the resulting AG 43 SS will prevail more often
  - This can push reserves above C3 Phase 2 TAR

Observations on U.S. RBC

AMERICAN ACADEMY *of* ACTUARIES

Objective. Independent. Effective.™

Observations on US RBC

- RBC was designed from the ground up, based on distributions of individual risks
- RBC is not a total balance sheet system, or a system based on an integrated view of risk for an organization
- RBC is defined according to statutory accounting principles:
  - The losses covered by RBC are defined relative to statutory principles
  - The goal of statutory reporting is the protection of policyholders; statutory accounting is different from US GAAP and different from fair value
- Certain RBC constraints affect the proper measurement of risks
  - Reliance on published statutory values
  - Desire for a simplistic, factor-based formula; avoidance of internal models
  - Uniform application to all insurers, ignoring varying risk profiles among insurers
  - Certain aspects of the calculation methodology are prescribed and have created disincentives to manage risk (e.g., variable annuities)

Observations on US RBC (cont.)

- Different constituencies quantify risk differently
  - RBC is a blunt instrument, designed for insurance regulators to identify potentially weakly capitalized companies
  - RBC was not designed to rank the capital strength of insurers; many have improperly used the RBC formula
  - Rating Agencies take a different view of risk and establish capital requirements using a different set of principles and methodology
  - Insurance companies take a different view of risk and establish internal capital requirements differently (e.g., a multiple of RBC or economic capital)
- RBC is one element of the US regulatory framework for monitoring the solvency of insurance companies
- RBC (the formula and where RBC fits into overall solvency framework) continues to evolve with more perspectives influencing its structure than ever before
  - International regulatory community
  - Federal government

Challenges with Modernizing the U.S. Solvency Framework

- Balancing the limitations of a simplistic, uniform formula with cost of implementing and regulating with more sophisticated methods for measuring risk (e.g., internal models)
- Pressure to use RBC as the best tool to regulate all risks (e.g., liquidity, longevity)
- Limited regulatory resources to review and synthesize results; a wide range of enterprise risk management (ERM) practices within the insurance industry
- Pressure to redesign the US RBC formula to be similar to other insurance regimes (e.g., Solvency II) or other financial sectors

Recent Changes to the U.S. Solvency Framework Strengthen the Regulation of Insurance

- Increased emphasis to the comparability of the US Solvency framework to other regulatory regimes (e.g., defining statistical bases for RBC factors, outcome-based focus)
- Increased attention to risk transfer between entities (e.g., shifting risk to captives, reinsurance collateral)
- Increased attention to defining capital requirements for risks missing from current RBC formulas (e.g., operational risk, catastrophe)
- Increased attention to the insurance group in addition to the legal entity
- Increased attention to ERM through the ORSA requirement

Additional Academy Resources

- Report to the NAIC's Solvency Modernization Task Force on the risks covered in the RBC formulas (January 31, 2011) http://actuary.org/files/American_Academy_of_Actuaries_SMI_RBC-Report_2.4.pdf
- Report to the NAIC: Comparison of the NAIC Life, P&C, and Health RBC Formulas (February, 2002) http://actuary.org/files/publications/jrbc_12feb02.pdf

Contact Information

Nancy Bennett

Senior Life Fellow

bennett@actuary.org

651.325.8394